

Appl. No. : **09/771,309**
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AMENDMENTS TO THE CLAIMS

1. (Previously Canceled)

2. (Previously Presented) A process for producing an aluminum alloy hollow material, comprising:

homogenizing an aluminum alloy ingot containing about 0.8 to about 1.5 wt% Mn; and

port hole extruding the ingot to produce a hollow material,

wherein said homogenizing of the ingot is carried out by maintaining the ingot at a first temperature of 500-630°C for more than zero but not more than about 24 hours, cooling the ingot down to a second temperature of about 400-500°C at a cooling velocity of not more than 100°C/hr, and maintaining the ingot at said second temperature for about 4 to 48 hours,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1.0 IACS%, and such that an electric conductivity value becomes at least 39.0 IACS%.

3. (Previously Presented) A process for producing an aluminum alloy hollow material, comprising:

homogenizing an aluminum alloy ingot containing about 0.8 to about 1.5 wt% Mn;

wherein said homogenizing of the ingot is carried out by raising the ingot to a temperature (T1) of 500-630°C, maintaining said ingot at said temperature T1 for more than zero but not more than about 16 hours, cooling the ingot from the temperature T1 to 350°C (T2) at a cooling velocity of not more than 100°C/hr, wherein the time between reaching the temperature T1 to reaching the temperature T2 is maintained within 10-48 hrs, and cooling the ingot at an optional cooling velocity from the temperature T2 to room temperature; and

port hole extruding the ingot to produce a hollow material,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1.0 IACS%, and such that an electric conductivity value becomes at least 39.0 IACS%.

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4. (Previously Canceled)

5. (Previously Presented) A process for producing an aluminum alloy hollow material, comprising:

homogenizing an aluminum alloy ingot containing about 0.3 to about 1.5 wt% Mn; and

port hole extruding the ingot to produce a hollow material;

wherein said homogenizing of the ingot is carried out by maintaining the ingot at a temperature of 400-500°C for 0.5-4 hours, elevating the temperature up to 550-630°C, maintaining the temperature for 0.5-4 hrs., cooling the ingot to 350°C at a cooling velocity of not more than 100°C/hr, and cooling the ingot from 350°C to room temperature at an optional cooling rate.

6. (Previously Canceled)

7. (Previously Presented) A process for producing an aluminum alloy extruded pipe material for air conditioner piping wherein an aluminum alloy ingot consisting of 0.8-1.5 wt% Mn, 0.1-0.7 wt% Fe, 0.03-0.6 wt% Si, and 1 or at least 2 of 0.00-0.45 wt% Cu, 0.0-0.3 wt% Mg, 0.0-0.3 wt% Cr, 0.0-0.1 wt% Ti, 0.0-0.5 wt% Zn, 0.0-0.3 wt% Zr, and 0.0-0.3 wt% Ni, the balance being aluminum, and any unavoidable impurities, that is excellent in the effect of preventing preferential corrosion, comprising:

homogenizing the aluminum alloy ingot; and

port hole extruding the ingot to produce a pipe material,

wherein said homogenizing of the ingot is carried out by maintaining the ingot at a first temperature of 500-630°C for more than zero but not more than about 24 hours, cooling the ingot down to a second temperature of about 400-500°C at a cooling velocity of not more than 100°C/hr, and maintaining the ingot at said second temperature for about 4 to 48 hours,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%, and such that an electric conductivity value becomes at least 39.0 IACS%.

8. (Currently Amended) A process for producing an aluminum alloy extruded pipe material for air conditioner piping wherein an aluminum alloy ingot consisting of 0.8-1.5 wt%

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Mn, 0.1-0.7 wt% Fe, 0.03-0.6 wt% Si, and 1 or at least 2 of 0.00-0.45 wt% Cu, 0.0-0.3 wt% Mg, 0.0-0.3 wt% Cr, 0.0-0.1 wt% Ti, 0.0-0.5 wt% Zn, 0.0-0.3 wt% Zr, and 0.0-0.3 wt% Ni, the balance being aluminum, and any unavoidable impurities, that is excellent in the effect of preventing preferential corrosion, comprising:

homogenizing the aluminum alloy ingot;

wherein said homogenizing of the ingot is carried out by raising the ingot to a temperature (T1) of 500-630°C, maintaining said ingot at said temperature T1 for more than zero but not more than about 48 hours, cooling the ingot from the temperature T1 to 350°C (T2) at a cooling velocity of not more than 100°C/hr, wherein the time between reaching the temperature T1 to reaching the temperature T2 is maintained within 12-48 hrs, and cooling the ingot at an optional cooling velocity from the temperature T2 to room temperature; and

port hole extruding the ingot to produce a pipe material,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%, and such that an electric conductivity value becomes at least 39.0 IACS%.

9. (Previously Canceled)

10. (Previously Presented) A process for producing an aluminum alloy extruded pipe material for air conditioner piping wherein an aluminum alloy ingot consisting of 0.8-1.5 wt% Mn, 0.1-0.7 wt% Fe, 0.03-0.6 wt% Si, and 1 or at least 2 of 0.00-0.45 wt% Cu, 0.0-0.3 wt% Mg, 0.0-0.3 wt% Cr, 0.0-0.1 wt% Ti, 0.0-0.5 wt% Zn, 0.0-0.3 wt% Zr, and 0.0-0.3 wt% Ni, the balance being aluminum, and any unavoidable impurities, comprising:

homogenizing the aluminum alloy ingot; and

port hole extruding the ingot to produce a pipe material;

wherein said homogenizing of the ingot is carried out by maintaining the ingot at a temperature of 400-500°C for 0.5-4 hours, elevating the temperature up to 550-630°C, maintaining the temperature for 0.5-4 hrs., cooling the ingot to 350°C at a cooling velocity of not more than 100°C/hr, and cooling the ingot from 350°C to room temperature at an optional cooling velocity.

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11. (Previously Presented) A process for producing an aluminum alloy hollow material as claimed in Claim 2, further comprising drawing-elongating following said port hole extruding.

12. (Previously Presented) A process for producing an aluminum alloy hollow material as claimed in Claim 3, further comprising drawing-elongating following said port hole extruding.

13. (Previously Canceled)

14. (Previously Presented) A process for producing an aluminum alloy hollow material as claimed in Claim 5, further comprising drawing-elongating following said port hole extruding.

15.-17. (Previously Cancelled)

18. (Previously Presented) A process for producing an aluminum alloy hollow material as claimed in Claim 10, wherein the processing is performed such that an electric conductivity of the pipe material is at least 39.0 IACS%.

19.-20. (Previously Canceled)

21. (Previously Presented) The process of Claim 5, wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%.

22. (Previously Presented) The process of Claim 10, wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the pipe material is not more than 1.0 IACS%.

23. (Previously Presented) A process for producing an aluminum alloy drawn pipe for heat exchanger piping, wherein the aluminum alloy ingot consists of 0.8-1.5wt% Mn, 0.1-0.7wt% Fe, and 0.03-0.6wt% Si, and 1 or at least 2 of 0.00-0.45wt% Cu, 0.0-0.3wt% Mg, 0.0-0.3wt% Cr, 0.0-0.1wt% Ti, 0.0-0.5wt% Zn, 0.0-0.3wt% Zr and 0.0-0.3wt% Ni, the balance being aluminum, and any unavoidable impurities, and wherein the effect of preventing preferential corrosion and the effect of preventing the surface fine striation of the drawn pipe are excellent, and drawing is conducted additionally after extrusion, comprising:

homogenizing the aluminum alloy ingot; and

wherein drawing is conducted after extrusion of port hole to manufacture pipe material,

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wherein said homogenizing of the ingot is carried out by maintaining the ingot at a first temperature of 500-630°C for more than zero but not more than 24 hours, cooling the ingot down to a second temperature of about 400-500°C at a cooling velocity of not more than 100°C/h, and maintaining the ingot at said second temperature for about 4 to 48 hours,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1 IACS%, and such that an electric conductivity value becomes at least 39.1 IACS%.

24. (Previously Presented) A process for producing an aluminum alloy drawn pipe for heat exchanger piping, wherein the aluminum alloy ingot consists of 0.8-1.5wt% Mn, 0.1-0.7wt% Fe, and 0.03-0.6wt% Si, and 1 or at least 2 of 0.00-0.45wt% Cu, 0.0-0.3wt% Mg, 0.0-0.3wt% Cr, 0.0-0.1wt% Ti, 0.0-0.5wt% Zn, 0.0-0.3wt% Zr and 0.0-0.3wt% Ni, the balance being aluminum, and any unavoidable impurities, and wherein the effect of preventing preferential corrosion and the effect of preventing fine striations on the surface of drawn pipe are excellent, and drawing is conducted additionally after extrusion, comprising:

homogenizing the aluminum alloy ingot;

wherein drawing is conducted after extrusion of port hole to manufacture pipe material,

wherein said homogenizing of the ingot is carried out by raising the ingot to a temperature (T1) of 500-630°C, maintaining said ingot at said temperature T1 for more than zero but not more than about 16 hours, cooling the ingot down to a second temperature of 350°C (T2) at a cooling velocity of not more than 100°C/h, wherein the time between reaching the temperature T1 to reaching the temperature T2 is maintained within 10-48 hrs, and cooling the ingot at an optional cooling velocity from the temperature T2 to room temperature; and

port hole extruding the ingot to produce a hollow material,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1 IACS%, and such that an electric conductivity value becomes at least 39.1 IACS%.

25. (Previously Presented) A process for producing an aluminum alloy material for heat exchanger piping, wherein the aluminum alloy ingot consists of 0.8-1.5wt% Mn, 0.1-0.7wt% Fe, and 0.03-0.6wt% Si, and 1 or at least 2 of 0.00-0.45wt% Cu, 0.0-0.3wt% Mg, 0.0-0.3wt% Cr, 0.0-0.1wt% Ti, 0.0-0.5wt% Zn, 0.0-0.3wt% Zr and 0.0-0.3wt% Ni, the balance being

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aluminum, and any unavoidable impurities, and wherein the effect of preventing preferential corrosion and the plasticity at the time of forming by form-rolling are excellent, and form-rolling is additionally conducted after extrusion and drawing, comprising:

homogenizing the aluminum alloy ingot;

wherein drawing is conducted after extrusion of port hole to manufacture pipe material,

wherein said homogenizing of the ingot is carried out by maintaining the ingot at a first temperature of 500-630°C for more than zero but not more than 24 hours, cooling the ingot down to a second temperature of about 400-500°C at a cooling velocity of not more than 100°C/h, and maintaining the ingot at said second temperature for about 4 to 48 hours,

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1 IACS%, and such that an electric conductivity value becomes at least 39.1 IACS%.

26. (Previously Presented) A process for producing an aluminum alloy material for heat exchanger piping, wherein the aluminum alloy ingot consists of 0.8-1.5wt% Mn, 0.1-0.7wt% Fe, and 0.03-0.6wt% Si, and 1 or at least 2 of 0.00-0.45wt% Cu, 0.0-0.3wt% Mg, 0.0-0.3wt% Cr, 0.0-0.1wt% Ti, 0.0-0.5wt% Zn, 0.0-0.3wt% Zr and 0.0-0.3wt% Ni, the balance being aluminum, and any unavoidable impurities, and wherein the effect of preventing preferential corrosion and the plasticity at the time of forming by form-rolling are excellent, and form-rolling is additionally conducted after extrusion and drawing, comprising:

homogenizing the aluminum alloy ingot;

wherein drawing is conducted after extrusion of port hole to manufacture pipe material,

wherein said homogenizing of the ingot is carried out by raising the ingot to a temperature (T1) of 500-630°C, maintaining said ingot at said temperature of T1 for more than zero but not more than about 16 hours, cooling the ingot down to a second temperature of 350°C (T2) at a cooling velocity of not more than 100°C/h, wherein the time between reaching the temperature T1 to reaching the temperature T2 is maintained within 10-48 hrs, and cooling the ingot at an optional cooling velocity from the temperature T2 to room temperature; and

port hole extruding the ingot to produce a hollow material,

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wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1 IACS%, and such that an electric conductivity value becomes at least 39.0 IACS%.

27. (Canceled)

28. (Previously Presented) A method of preventing striations in drawn extruded hollow material, the method comprising:

homogenizing an aluminum alloy ingot consisting of 0.8-1.5wt% Mn, 0.1-0.7wt% Fe, and 0.03-0.6wt% Si, and 1 or at least 2 of 0.00-0.45wt% Cu, 0.0-0.3wt% Mg, 0.0-0.3wt% Cr, 0.0-0.1wt% Ti, 0.0-0.5wt% Zn, 0.0-0.3wt% Zr and 0.0-0.3wt% Ni, the balance being aluminum and any unavoidable impurities;

wherein said homogenizing of the aluminum alloyingot is carried out by raising the ingot to a temperature (T1) of 500-630°C, maintaining said ingot at said temperature T1 for more than zero but not more than about 16 hours, cooling the ingot down to a second temperature of 350°C (T2) at a cooling velocity of not more than 100°C/h, wherein the time between reaching the temperature T1 to reaching the temperature T2 is maintained within 10-48 hrs, and cooling the ingot at an optional cooling velocity from the temperature T2 to room temperature; and

port hole extruding the ingot to produce a hollow material; and

drawing the material to manufacture pipe material that is substantially free of surface striations;

wherein the processing is performed such that a difference in electric conductivity of individual portions in a lengthwise direction of the hollow material is not more than 1 IACS%, and such that an electric conductivity value becomes at least 39.1 IACS%.